



Adapted for  
Montgomery County Fire & Rescue  
Driver Training Program



MARYLAND FIRE AND RESCUE INSTITUTE • UNIVERSITY OF MARYLAND

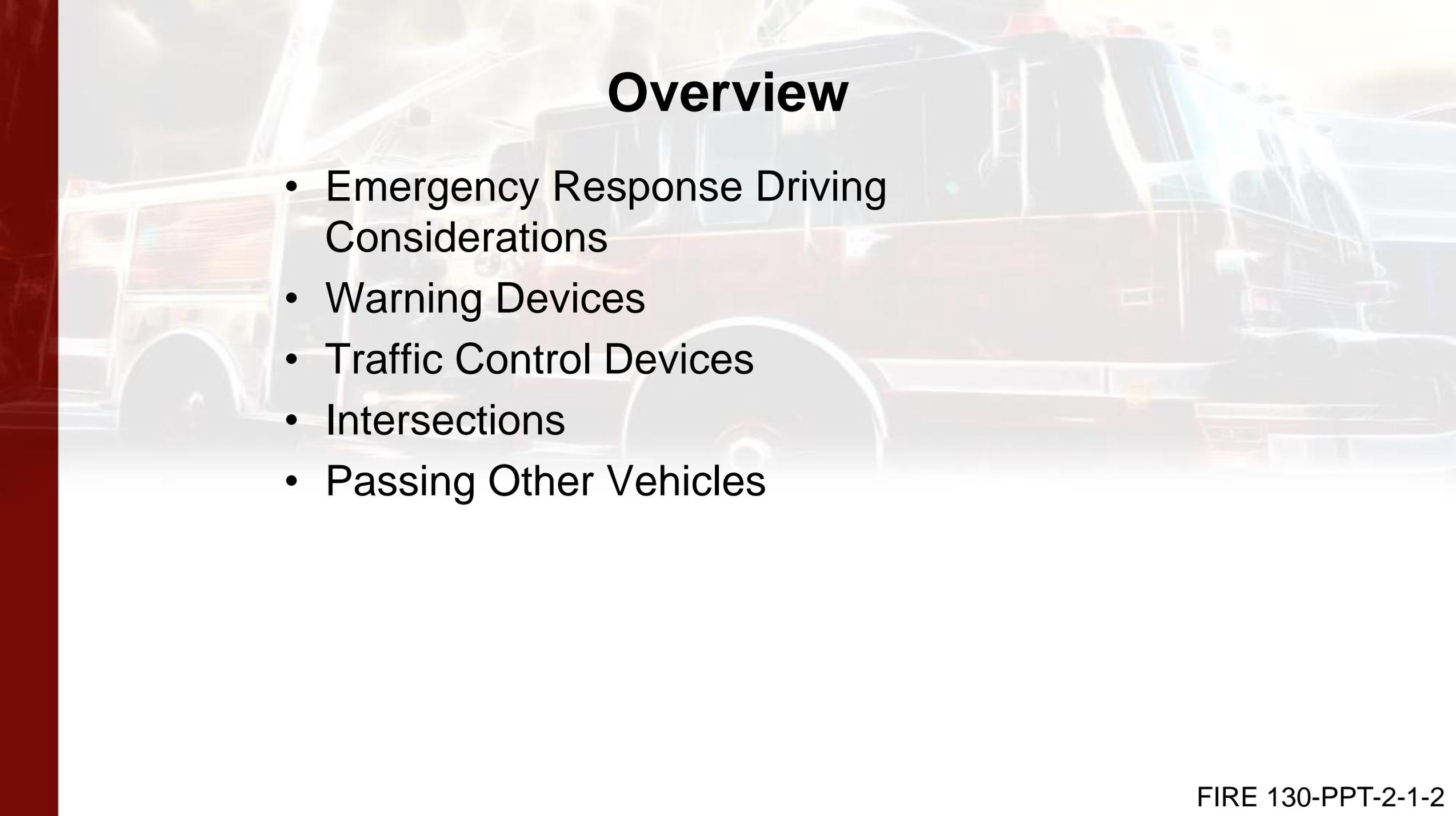
# Emergency Vehicle Operator

**Lesson 2-1:  
Emergency Response Driving  
Considerations**



# Student Performance Objective

- After completing this lesson, the student shall be able to identify safety considerations for operating emergency vehicles. In addition, students will be able to demonstrate skills in safely operating and driving an apparatus.



# Overview

- Emergency Response Driving Considerations
- Warning Devices
- Traffic Control Devices
- Intersections
- Passing Other Vehicles

# Emergency Response Driving Considerations

- In most jurisdictions civilian drivers that encounter emergency vehicles must do the following until the emergency vehicle has passed:
  - Pull to the right
  - Stop
  - Clear the intersection
  - Remain motionless



# MARYLAND CODE – TRANSPORTATION

## § 21-405 & § 21-510 – YIELD TO EMERGENCY VEHICLES

On the immediate approach of an emergency vehicle using **audible and visual signals**:

- Drivers and pedestrians shall *yield the right-of-way*.
- Drivers shall drive immediately to *a position parallel to and as close as possible to the edge or curb of the roadway*, clear of any intersection.
- Drivers shall stop and stay in this position until the emergency vehicle has passed.



# MARYLAND CODE – TRANSPORTATION

## § 21-706 - PASSING SCHOOL VEHICLE

- (a) If a school vehicle has stopped on a roadway and is operating the alternately flashing red lights, the driver of *any other vehicle* meeting or overtaking the school vehicle shall stop at least 20 feet from the front or rear of the school vehicle.
- (b) If a school vehicle has stopped on a roadway and is operating the alternately flashing red lights, the driver of any other vehicle meeting or overtaking the school vehicle may not proceed until the school vehicle resumes motion or the alternately flashing red lights are deactivated.
- (c) Exceptions. -- This section does not apply to the driver of a vehicle on a divided highway, if the school vehicle is on a different roadway.

# Emergency Response Driving Considerations

- Driver/operators must never assume that civilian drivers will react appropriately when encountering emergency vehicles.

## Appropriate reactions

- Pull to the right
- Stop
- Clear intersections
- Remain motionless

## Other possible reactions

- Pull over for first apparatus and pull out in front of next apparatus
- Panic at approaching apparatus
- Abruptly stop in intersection
- Fail to hear apparatus approaching

# Emergency Response Driving Considerations

- Driver/operators should anticipate responses and plan to avoid collisions.

Aim high in steering

Get the big picture

Keep your eyes moving

Leave yourself an "out"

Maintain distance

Make sure others can see and hear you

# SMITH SYSTEM



**Aim High in Steering**

**Get the Big Picture**

**Allow an Out**

**Keep your eyes moving**

**Keep your vehicle visible**



**Smith System  
"Street Smart" DVD**

# AIM HIGH SMITH SYSTEM

- Look at the area 8 to 12 seconds ahead of your vehicle
- Center your vehicle in the driving lane
- Find the path of least resistance
- Adjust your following distance
- Blend into the flow of traffic





# GET THE BIG PICTURE SMITH SYSTEM

- Know what is ahead, beside, and behind you
- Predict other drivers' actions
- Hear the radio traffic
  - What other units are enroute?
  - Are there other calls in the same area?
  - Is there a true emergency?
- Listen for other sirens
- Find trouble before it finds you

The “big  
picture” is vital  
to safe driving

# BESIDE AND BEHIND YOU

## THE BIG PICTURE

- Always know what's happening beside you
- Check mirrors before slowing down, stopping, decelerating
- Check mirrors on long or steep hills
- Convex mirrors tell a bigger story
- Depth perception can be altered by mirrors
  - Know landmarks on the apparatus to aid with depth perception

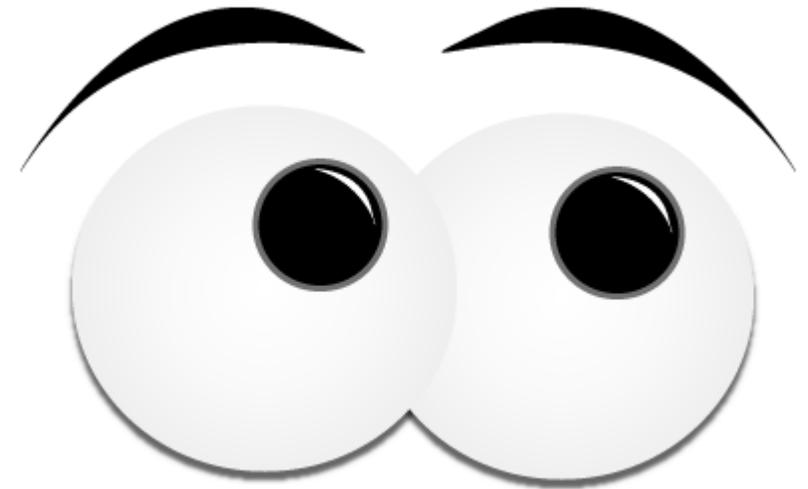




# KEEP YOUR EYES MOVING

## SMITH SYSTEM

- Do not fixate on one area or object
- Key to remaining alert and engaged
- Check the mirrors frequently
- Becomes difficult at night or when fatigued
- Random eye movement is bad
- Staring at an object also leads to drifting toward the object



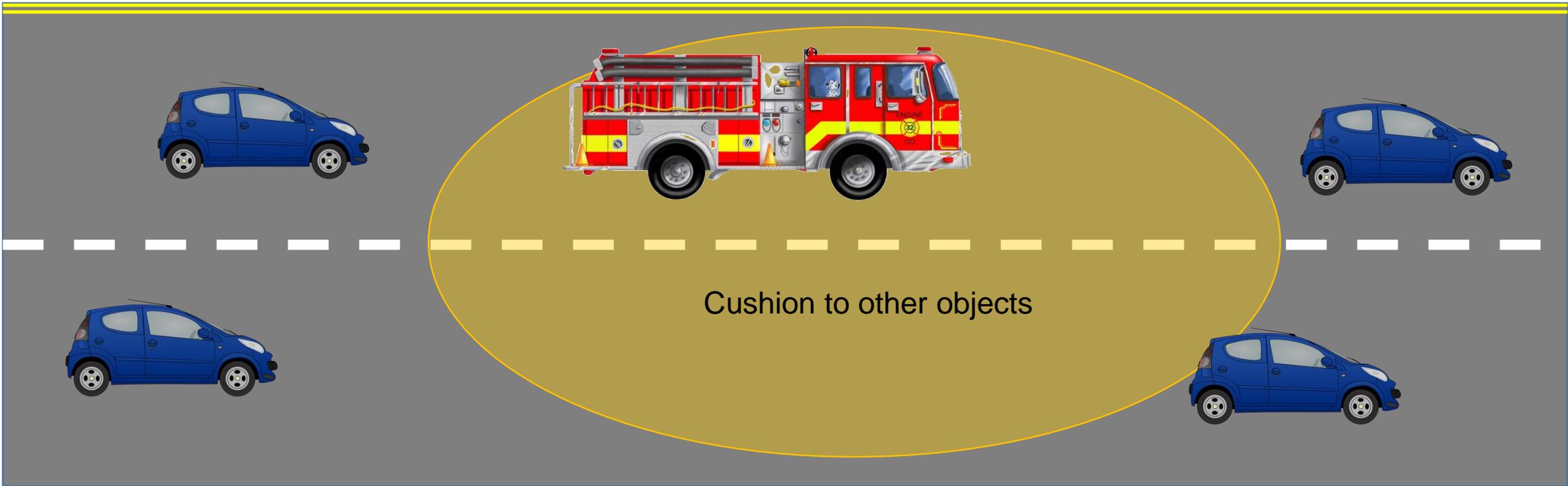
# ALLOW AN OUT SMITH SYSTEM

- Maintain adequate following distance
  - “Decision Space”
- Be prepared to yield
- Don’t get boxed in
- Time your passing moves
- When stopped in traffic, keep a gap ahead of you to allow a lane change



# DECISION SPACE

## ALLOW AN OUT

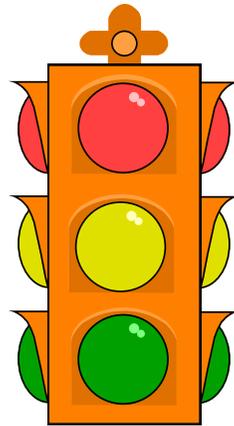


Impossible in the DC Metro area?

# DECISION SPACE

## ALLOW AN OUT

Perception Time +  
Reaction Time +  
Braking Time =



# Stopping Distance

Perception  $\frac{3}{8}$  to  $\frac{3}{4}$  second

Reaction  $\frac{3}{4}$  second

Add  $\frac{1}{2}$  to 1 second for  
air brake lag time

Braking  $2\frac{1}{2}$  seconds

Stopping Time 5 seconds

Based upon 40 mph on wet roads.



# STOPPING DISTANCE

## ALLOW AN OUT

Dry road; 25mph = 38 ft/sec



Wet road; 25mph = 38 ft/sec



Dry road; 40mph = 59 ft/sec





# STOPPING TIME – AIR BRAKE UNIT

## ALLOW AN OUT

Vehicle Speed		Dry Pavement Coefficient of Friction = 0.7		Wet Pavement Coefficient of Friction = 0.4	
		Stopping Distance	Stopping Time	Stopping Distance	Stopping Time
MPH	Ft/S				
60	90	407 ft	4.5 sec	542 ft	6 sec
45	66	262 ft	4 sec	336 ft	5 sec
35	51	185 ft	3.6 sec	229 ft	4.5 sec
25	38	127 ft	3.4 sec	149 ft	4 sec

How do you measure your decision space?

# DECISION SPACE – 4 SECOND RULE

## ALLOW AN OUT

<40mph

4 seconds

Each additional 10mph

1 second

Poor Road Conditions

1 second

Apparatus traveling on wet pavement at 60mph

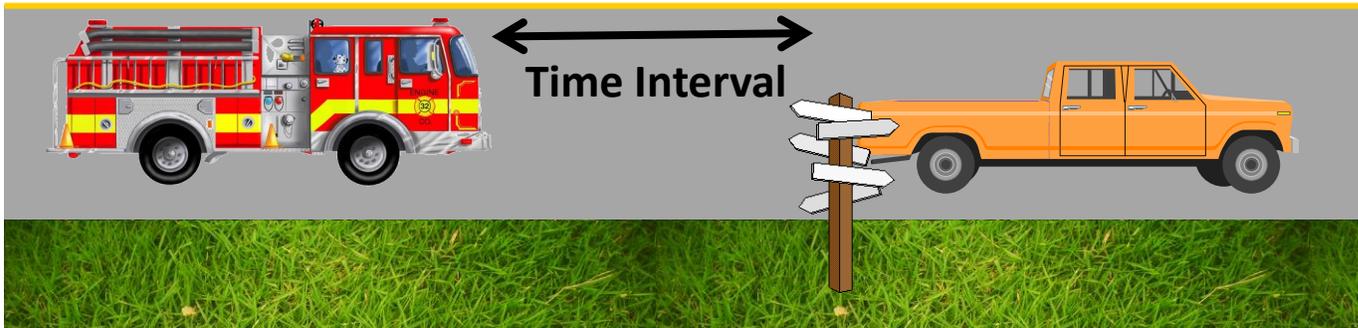
4 seconds

1 second

1 second

1 second

**= 7 seconds**





# DECISION SPACE

## ALLOW AN OUT

Vehicle Speed	Dry Pavement		Wet Pavement	
	Stopping Time	4-Second Rule	Stopping Time	4-Second Rule
MPH	Stopping Time	Interval Time	Stopping Time	Interval Time
60	4.5 sec	$4+1+1 = 6 \text{ sec}$	6 sec	$4+1+1+1 = 7 \text{ sec}$
45	4 sec	$4+1 = 5 \text{ sec}$	5 sec	$4+1+1 = 6 \text{ sec}$
35	3.6 sec	4 sec	4.5 sec	$4+1 = 5 \text{ sec}$
25	3.4 sec	4 sec	4 sec	$4+1 = 5 \text{ sec}$

In each situation you have enough time to perceive the hazard, react, and stop.

# DECISION SPACE

## ALLOW AN OUT

Even when stopped, leave sufficient space between your vehicle and the vehicle ahead:

- Vehicle in front starts to roll back
- Car behind needs more space to stop
- Car ahead becomes disabled
- You get a call!





# KEEP YOUR VEHICLE VISIBLE

## SMITH SYSTEM

- Know where you are going
- Pick a lane early and stick with it
- Signal your intentions
- Make eye contact
- Pay attention
- Slow down ahead of gridlock





# SIPDE

## PROACTIVE DRIVING FORMULA

- Sense
  - You need to see/hear/smell/feel it
- Identify
  - Your brain needs to recognize it
- Predict
  - Your brain needs to figure out what is going to happen
- Decide
  - What are your options based upon your prediction?
- Execute
  - Make it happen



# DECISION MAKING

**Seeing**  
**Hearing**  
**Feeling**

**Knowledge - Training**  
**Experience - Attitude**



**DECISIONS**

# Warning Devices

- Fire apparatus are equipped with audible and visual warning devices.

Warning devices are used to make the public aware of approaching emergency vehicles

Use of warning devices should be limited to true emergencies

Some departments require warning devices to be turned off on limited access highways

Warning devices are used to help negotiate passage in slow traffic



# MARYLAND CODE – TRANSPORTATION

## § 22-218 - AUDIBLE AND VISUAL SIGNALS

- Every emergency vehicle, in addition to any other equipment and distinctive markings required, shall be equipped with a siren, exhaust whistle, or bell capable of giving an audible signal.
- Every emergency vehicle, in addition to any other equipment and distinctive markings required by the Maryland Vehicle Law, shall be equipped with signal lamps mounted as high as practicable, which shall be capable of displaying to the front and to the rear a flashing red light or lights. These lights shall have sufficient intensity to be visible at 500 feet in normal sunlight.
- Fire Apparatus and Ambulances may be equipped with or display red and/or white lights or signal devices.



# MARYLAND CODE – TRANSPORTATION

## § 21-106 - EMERGENCY RESPONSE

- Privileges are granted when:
  - Responding to an emergency call;
  - Responding to, but not while returning from, a fire alarm
- Privileges granted to fire department drivers are:
  - (1) Park or stand without regard to the other provisions of this title;
  - (2) Pass a red or stop signal, a stop sign, or a yield sign, **but only after slowing down as necessary for safety**;
  - (3) Exceed any maximum speed limit, but only so long as the driver does not endanger life or property;
  - (4) Disregard any traffic control device or regulation governing direction of movement or turning in a specified direction (no left turn, no u-turn, etc.)

# Warning Devices

- Audible warning devices may include sirens or air horns.

The emergency vehicle may outrun the effective range of the audible warning device if it is traveling at speeds over 50 mph (80 km/h)

Multiple emergency vehicles travel at least 300 to 500 feet (90 to 150 m) apart

# Warning Devices

- Visual warning devices
  - A combination of lights may be used as visual warning devices on apparatus.

White  
lights

Colored  
lights

Warning  
lights

Headlights

# Traffic Control Devices

- Driver/operators must continue to use defensive driving techniques, even if a traffic control device is present.

## Green light

Maintain speed  
that allows for  
quick stop or safe  
evasive maneuver

## Red light

Approach with  
extreme caution

Bring apparatus to  
a complete stop  
before proceeding

# Traffic Control Devices

- Traffic signals in front of the station allow apparatus to more safely enter the roadway.

## Controlled

- By a button in the station
- Remotely by a dispatcher
- By a station alerting system



# Traffic Control Devices

- Traffic signals along the route of travel may be controlled by the fire department.



Strobe Light Activated  
Preemption Devices

Traffic Signal Preemption  
Devices

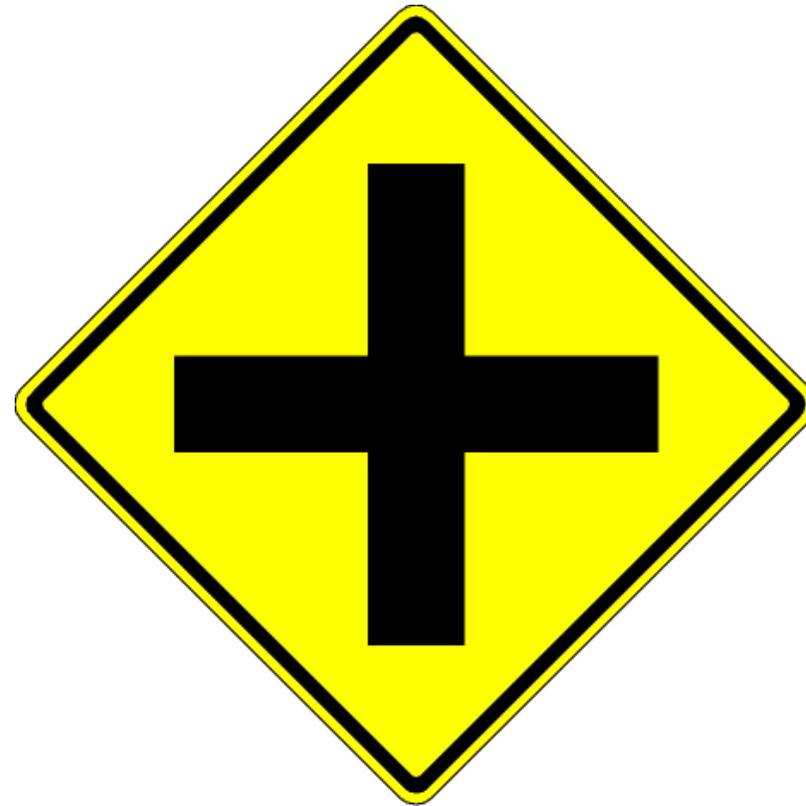
GPS Based Traffic Signal  
Preemption

# Intersections

- Intersections are the most likely place for a collision to occur involving an emergency vehicle.
  - Know statutes and department policies regarding intersections
  - Many jurisdictions and NFPA® require:
    - Full stop
    - Accounting for vehicles in all lanes before proceeding
  - Be cautious on multilane roads
    - The driver/operator may have to place apparatus in unconventional places.
    - If all lanes are blocked, it may be allowable to drive in opposing lane of traffic.

# INTERSECTION BEHAVIORS

- Approaching
- Entering
- Jumping
- Other units



*Most likely location for an apparatus crash.*

# INTERSECTIONS

## APPROACHING

- One of the best proactive driving tactics is to reduce speed
- Adjust your speed to the available space cushion
  - Intersections are fixed object that as you close the gap you need to also reduce the stopping distance
- Reducing your speed gives other vehicles time to react to your approach
  - Let the play develop
- Change your siren cadence



# INTERSECTIONS

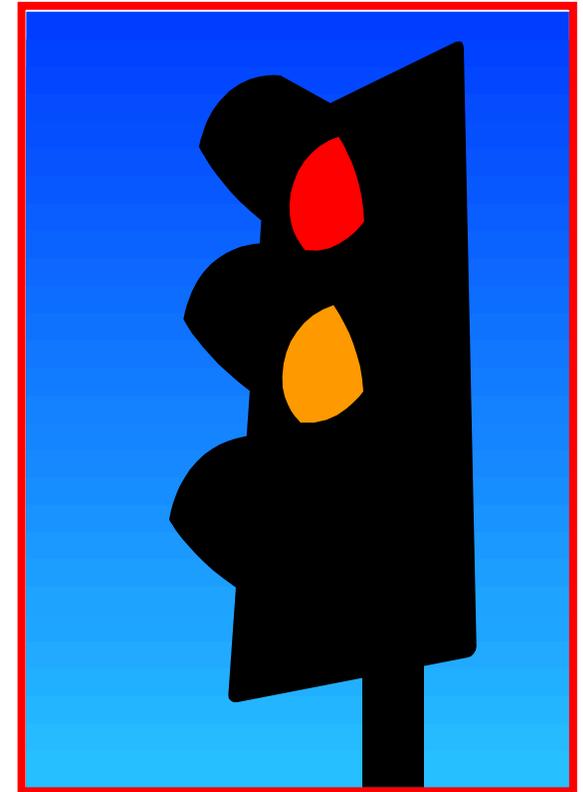
## APPROACHING

- Search ahead and identify potential hazards
  - Other vehicles
  - Pedestrians
  - Bicycles
  - Blind spots – buses, trees, buildings
  - Status of control devices – traffic lights, pedestrian crossing signals
- Identify the path of least resistance
  - Lane patterns
  - Avoid opposing traffic
- Cover the brake



# TRAFFIC CONTROL DEVICES

- Stale green
- Stale yellow
- Flashing yellow means proceed with caution
- Flashing red means stop before proceeding
- Yield sign
- Stop sign
- Four-way stops



# INTERSECTIONS

## SEARCH & IDENTIFY

#1



#2



# INTERSECTIONS SEARCH & IDENTIFY



# INTERSECTIONS

## SEARCH & IDENTIFY

#1



#2



# INTERSECTIONS

## ENTERING



- Entry occurs as soon as your front bumper crosses into cross-traffic
- If you cannot positively identify that right-of-way has been yielded to you, you must stop
  - Must do this for each individual lane
- Make eye contact with other drivers
  - Are other cars “acting” like they see you?
- Even when entering with the green light remain vigilant of other vehicles entering the intersection
- Avoid using the apparatus as a moving roadblock – this is aggressive driving



# INTERSECTIONS

## THE OPEN LANE

- Be especially wary of lanes that are not blocked by vehicles that have yielded to you.
  - Open lanes are an opportunity to accelerate through the intersection to bypass the stopped vehicles
  - Open lane enables traffic to approach at higher rates of speed
  - Traffic that is already stopped obscures visibility to the oncoming vehicle or the oncoming vehicle's view of you
  - People see a green light and want to GO.
- Account for all lanes, including turn lanes, before fully committing to an intersection. Recognize that civilian drivers may not always do the right thing, such as using a turn lane to circumvent stopped cars, running a yellow or red light, or simply electing to not yield the right-of-way to you.

# INTERSECTIONS

## JUMPING



- Operator depresses the accelerator hard from stopped position
- Vehicle jerks or jumps forward
- Hard on the apparatus
- Jumps before other vehicle moves forward is a common low speed, at-fault collision
- Smooth starts allow for decision space

# INTERSECTIONS PROCESSION RESPONSE

- Travel single file with largest vehicle leading to create a path
- Maintain space cushions
  - Expect the leading unit to stop
- Each vehicle must use the normal precautions
  - Proceed as though no other units already entered
- Use contrasting siren tones
  - electronic siren with alternating or pulsing tone.

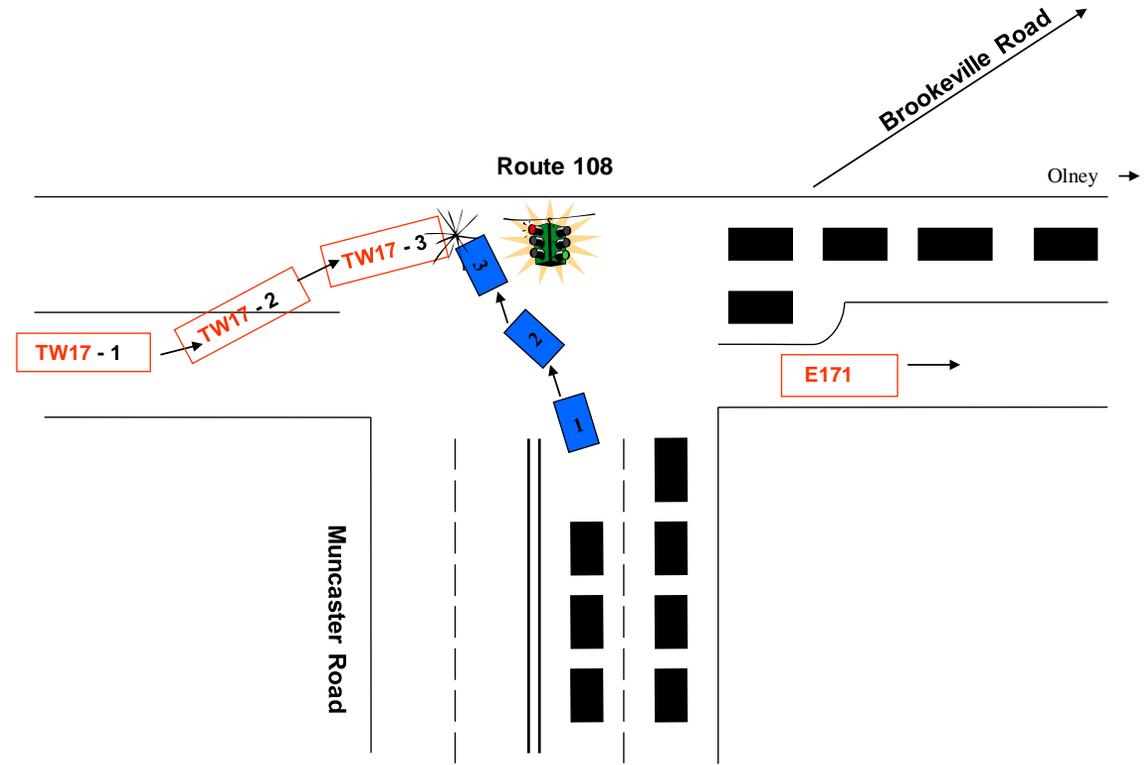


# TANKER 17 – FATAL COLLISION

## JUNE 22, 2000



- Multiple responding units
- Zone of confusion
- Evasive maneuver













# Passing Other Vehicles

- It is best to avoid passing vehicles that do not pull over to yield to apparatus.
  - Travel on innermost lane and wait for vehicles to move to the right before passing
  - Avoid passing on the right side
  - Be certain opposing lanes are clear before crossing center line
  - Avoid passing other emergency vehicles
    - Smaller vehicles may pass larger apparatus
    - Coordinate maneuvers by radio



# ARRIVING ON SCENE

## STRUCTURE FIRES

- EMS transport units are NOT primary units
  - Engines, aerials, rescue squads
- Hold your radio traffic to allow primary units to have air time
  - No initial on-scene report is required by EMS units
- Park for egress to allow patient transport
- Gather equipment and recon the scene
  - Conduct a 360° survey
  - Focus on life safety hazard/occupant status
  - Identify hazards to initial operations, i.e. downed wires, animals, hoarding conditions

# Student Performance Objective

- After completing this lesson, the student shall be able to identify safety considerations for operating emergency vehicles. In addition, students will be able to demonstrate skills in safely operating and driving an apparatus.

# Review

- Emergency Response Driving Considerations
- Warning Devices
- Traffic Control Devices
- Intersections
- Passing Other Vehicles